EXHIBIT 19

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD., SAMSUNG ELECTRONICS AMERICA, INC., GOOGLE LLC, and CISCO SYSTEMS, INC.,
Petitioners

v.

XR COMMUNICATIONS, LLC, D/B/A VIVATO TECHNOLOGIES,
Patent Owner

IPR2022-00613
Patent No. 10,594,376

PATENT OWNER'S RESPONSE

TABLE OF CONTENTS

Patent Owner's Exhibit List

Exhibit	Description
2001	Joint Claim Construction Statement, *XR Communications v. Samsung*, W.D. Tex. Case No. 21-cv-00626-ADA, Dkt. No. 40 (June 8, 2022) ("JCCC")
2002	U.S. Patent Publication 2004/0014429 ("Guo")
2003	Case Readiness Status Report, *XR Communications v. Samsung*, W.D. Tex. Case No. 21-cv-00626-ADA, Dkt. No. 24 (Dec. 13, 2021)
2004	Order Appointing Technical Advisor, *XR Communications v. Samsung*, W.D. Tex. Case No. 21-cv-00626-ADA, Dkt. No. 34 (Apr. 21, 2022)
2005	Defendants' Preliminary Invalidity Contentions for U.S. Patent No. 10,594,376 in *XR Communications v. Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc.*, W.D. Tex. Case No. 21-CV-00626-ADA, *XR Communications v. Google LLC*, W.D. Tex. Case No. 21-CV-00625-ADA, and *XR Communications v. Cisco Systems, Inc. and Meraki LLC*, W.D. Tex. Case No. 21-CV-00623-ADA
2006	Plaintiff XR Communications, LLC's Preliminary Disclosure Of Asserted Claims and Infringement Contentions cover pleadings in *XR Communications v. Cisco Systems, Inc. and Meraki LLC*, W.D. Tex. Case No. 21-CV-00623-ADA
2007	Plaintiff XR Communications, LLC's Preliminary Disclosure Of Asserted Claims and Infringement Contentions cover pleadings in *XR Communications v. Google LLC*, W.D. Tex. Case No. 21-CV-00625-ADA
2008	Plaintiff XR Communications, LLC's Preliminary Disclosure Of Asserted Claims and Infringement Contentions cover pleadings in *XR Communications v. Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc.*, W.D. Tex. Case No. 21-CV-00626-ADA

2009	July 25, 2022, Order Assigning the Business of the Court as it Relates to Patent Cases (W.D. Tex.)
2010	Court's Preliminary Claim Constructions in *XR Communications v. Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc.*, W.D. Tex. Case No. 21-CV-00626-ADA, *XR Communications v. Google LLC*, W.D. Tex. Case No. 21-CV-00625-ADA, and *XR Communications v. Cisco Systems, Inc. and Meraki LLC*, W.D. Tex. Case No. 21-CV-00623-ADA
2011	9/1/22 Markman Hearing Transcript in *XR Communications v. Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc.*, W.D. Tex. Case No. 21-CV-00626-ADA, *XR Communications v. Google LLC*, W.D. Tex. Case No. 21-CV-00625-ADA, and *XR Communications v. Cisco Systems, Inc. and Meraki LLC*, W.D. Tex. Case No. 21-CV-00623-ADA
2012	Special Master Report and Recommendation on Claim Construction, *XR Comm'ns LLC v. D-Link Sys.*, C.D. Cal. Case No. 8:17-cv-569-DOC-JDE, Dkt. No. 280 (Jan. 27, 2022)
2013	Order Adopting Special Master's Report and Recommendations re: Clam Construction, *XR Comm'ns LLC v. D-Link Sys.*, C.D. Cal. Case No. 8:17-cv-569-DOC-JDE, Dkt. No. 312 (Apr. 18, 2022)
2014	Claim Construction Order, *XR Comm'ns LLC v. Cisco Sys.*, W.D. Tex. Case No. 6:21-cv-00623-ADA, Dkt. No. 56 (Sept. 30, 2022)
2015	Transcript of Deposition of Zhi Ding, Ph.D. on Jan. 30, 2022
2016	"Transceiver" in IEEE 100 Authoritative Dictionary of IEEE Standards Terms, 7th Ed. (2000)
2017	"Transceiver" in McGraw-Hill Dictionary of Scientific and Technical Terms, Fourth Edition (1989)
2018	Declaration of Branimir Vojcic, D. Sc.

I. Introduction

The Petition rests on two faulty premises. *First*, Petitioners must show that Gerlach discloses or renders obvious, alone or in combination with Barratt, a "processor" configured to perform specific steps, with specific structural relationships to other claimed structures. *Second*, Petitioners must show that Gerlach discloses or renders obvious, alone or in combination with Barratt, a "transceiver" coupled to the processor and to the claimed smart antenna.

Both of these structures are prominently absent from Gerlach, the primary reference, and Petitioners' efforts to shoehorn these structures into Gerlach's disclosures under the guise of inherent disclosure or single-reference obviousness all fail. And instead of presenting proper evidence of motivation to combine Gerlach with Barratt, Petitioners rely on hindsight and conclusory expert testimony, which is rebutted by the testimony of Patent Owner's expert Dr. Branimir Vojcic. Because the Petition cannot show a "processor" or a "transceiver" as claimed, the Petition fails to meet its burden to prove unpatentability of any challenged claim.

II. '376 Patent (Ex. 1001)[1]

A. Summary of '376 patent

The '376 patent (Ex. 1001) is entitled "Directed wireless communication" and relates to "a multi-beam directed signal system [] implemented to communicate over

[1] See Ex. 2018, Declaration of Branimir Vojcic, D. Sc. ("Vojcic Decl.") ¶¶ 29–32.

a wireless communication link via an antenna assembly with client devices." '376 patent at 3:11-15. The '376 patent focuses on updating the spatial distribution of the beams based on feedback information from connected client devices, like laptops and mobile phones in the field of wireless communications, including "WiFi" networks that operate in accordance with "IEEE 802.11" standards. The '376 Patent generally relates to "beam- forming," which is depicted in several figures, including Figures 2, 3, 5, 6, 12, 14, and 15.

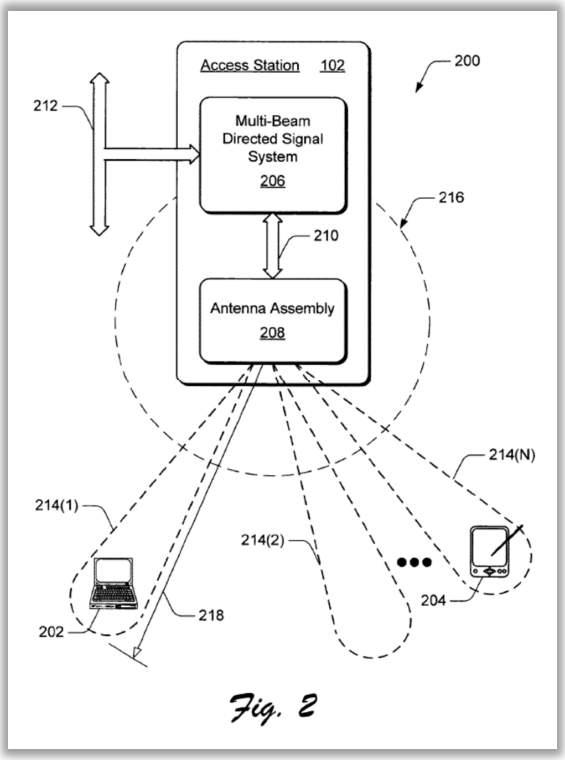

Fig. 2

As the patent explains, "beam- forming" refers to when the "electromagnetic waves are *focused* in a desired direction," unlike a conventional omni-directional transmission that transmits in all directions. '235 Patent, 5:22-55. The patent

describes improvements in "beam-forming," including sending a probing signal to two or more client devices and receiving feedback information from each device. Based on the received feedback information, the system determines where to place transmission peaks and transmission nulls to improve and optimize communications with multiple client devices. For example, the system enables patterns of electromagnetic signals that provide "a first transmission peak" at a first client device, "a second transmission peak" at a second client device, and "a first transmission null" at a third client device. In this example, the system advantageously improves communications with the first and second client devices, while blocking interference from the third client device.

The '376 patent recites a Provisional Patent Application No. 60/423,660, filed on Nov. 4, 2002, but claim priority to at least February 1, 2002.

B. Challenged Claims

The Petition challenges claims 1–34 of the '376 patent. Pet. at 2. Independent claim 1 is representative for purposes of the arguments in this POR. Claim 1 recites:

[1P]	A data-communications networking apparatus, comprising:
[1A]	a processor configured to:
[1A(i)]	generate a probing signal for transmission to at least a first client device and a second client device;
[1A(ii)]	generate a first data stream for transmission to the

	first client device; and
[1A(iii)]	generate a second data stream for transmission to the second client device; and
[1B]	a transceiver operatively coupled to the processor and configured to:
[1B(i)]	transmit the probing signal to at least the first client device and the second client device via a smart antenna;
[1B(ii)]	wherein the smart antenna is operatively coupled to the transceiver and comprises a first antenna element and a second antenna element;
[1C]	wherein one or more of the processor, the transceiver, or the smart antenna is further configured to:
[1C(i)]	receive a first feedback information from the first client device in response to the transmission of the probing signal;
[1C(ii)]	receive a second feedback information from the second client device in response to the transmission of the probing signal;
[1C(iii)]	determine where to place transmission peaks and transmission nulls within one or more spatially distributed patterns of electromagnetic signals based in part on the first and the second feedback information;
[1C(iv)]	transmit the first data stream to the first client

	device via the one or more spatially distributed patterns of electromagnetic signals; and
[1C(v)]	transmit the second data stream to the second client device via the one or more spatially distributed patterns of electromagnetic signals;
[1D]	wherein transmission of the first data stream and transmission of at least part of the second data stream occur at the same time; and
[1E]	wherein the one or more spatially distributed patterns of electromagnetic signals are configured to exhibit a first transmission peak at a location of the first client device and a second transmission peak at a location of the second client device.

The other independent claims (claims 12, 22, and 32) have similar limitations, and the Petition generally treats claim 1 as representative of those claims. The remaining claims (claims 2–11, 13–21, 23–31, and 33–34) are dependent claims that further limit the prior independent claims.

C. Level of Skill in the Art

A person of ordinary skill in the art ("POSITA") of the patented technology at the time of the invention of the asserted patents would have a bachelor's degree in electrical engineering or the equivalent and 2–3 years of work experience with digital wireless communication, or the equivalent. Vojcic Decl. ¶¶ 16–19.

Petitioners' definition of the level of ordinary skill is: "A person having ordinary skill in the art would have had at least a Bachelor's degree in Electrical Engineering or a related field, and three to four years of work experience in wireless communications, or a Master's degree and at least two years of work experience in wireless communications." Ding Decl. (EX-1003) at ¶¶ 22–25.

Although Patent Owner's and Petitioners' proposed level of skill in the art is slightly different, none of Dr. Vojcic's opinions or the arguments in this POR would be different under Petitioners' level of ordinary skill.

D. Claim Construction

Claim construction order shave been entered in related district court actions construing certain terms of the '376 patent and giving certain terms their plain and ordinary meaning. In *XR Comm'ns LLC v. D-Link Sys.*, No. 8:17-cv-569-DOC-JDE, Dkt. No. 280 (C.D. Cal. Jan. 27, 2022), the Special Master in that action recommended the following constructions relevant to the claims at issue here:

Term	Special Master's Recommendation
"a processor configured to: generate a probing signal for transmission to at least a first client device and a second client device"	Plain meaning.

Term	Special Master's Recommendation
"wherein one or more of the processor, the transceiver, or the smart antenna is further configured to: …"	Plain meaning (As discussed above, the claims require only that "one or more" "is further configured," not necessarily that each and every one of "the processor," "the transceiver," and "the smart antenna" is so configured)
"an 802.11 standard"	"one of the IEEE 802.11 standards that existed at the time of the invention"

In the same action, *XR Comm'ns LLC v. D-Link Sys.*, No. 8:17-cv-569-DOC-JDE, Dkt. No. 312 (C.D. Cal. Apr. 18, 2022), the court in that action adopted the following constructions relevant to the claims at issue here:

Term	Court's Construction
"a processor configured to: generate a probing signal for transmission to at least a first client device and a second client device"	Plain meaning.
"wherein one or more of the processor, the transceiver, or the smart antenna is further configured to: …"	Plain meaning (As discussed in the R&R, the claims require only that "one or more" "is further configured," not necessarily that each and every one of "the processor," "the transceiver," and "the smart antenna" is so configured, see R&R at 25.)

Term	Court's Construction
"an 802.11 standard"	"one of the IEEE 802.11 standards that existed at the time of the invention"

In *XR Comm'ns LLC v. Cisco Sys.*, No. 6:21-cv-00623-ADA, Dkt. No. 56 (W.D. Tex. Sept. 30, 2022), the court in that action adopted the following constructions relevant to the claims at issue here:

Term	Court's Final Construction
"802.11 Standard"	Plain-and-ordinary meaning.
"transmission nulls"	Plain and ordinary meaning wherein the plain-and-ordinary meaning is "portions of one or more spatially distributed patterns of electromagnetic signals where transmissions of no or insignificant energy are selectively directed."
"transmission peaks"	Plain-and-ordinary meaning[1] [1] – Note not for the jury: The plain-and-ordinary meaning of "transmission peaks" includes relative maxima.

Patent Owner and its expert Dr. Vojcic have applied the plain and ordinary meaning of each claim term. Dr. Vojcic's opinions and the arguments in this POR would be the same either without claim construction or under any of the claim construction orders described above.

III. Petitioners' Asserted Grounds and References

The Petition asserts two grounds unpatentability (Pet. at 2):

- Ground 1: Claims 1-9, 12-18, and 22-34 are obvious in light of Gerlach and Barratt
- Ground 2: Claims 10-11 and 19-21 are obvious in light of Gerlach, Barratt, and Okamoto

A. Gerlach Primary Reference

Gerlach (Ex. 1005) was previously considered during prosecution of the '376 Patent. Gerlach relates to optimizing the directional properties of information signals. Gerlach, Abstract. As Petitioners' note, Gerlach "provides ***limited disclosure*** of the architecture of a network-based wireless apparatus", providing only "conceptual figures." Pet. at 16. In particular, Petitioners acknowledge that Gerlach's Figs. 3a and 3b (which Petitioners' rely upon throughout their Petition) only "conceptually depict[s] portions of the wireless communication system." Pet. at 21 (discussing the preamble). Indeed, Fig. 3a and the corresponding disclosures fail to disclose many elements of the independent claims of the '376 patent.

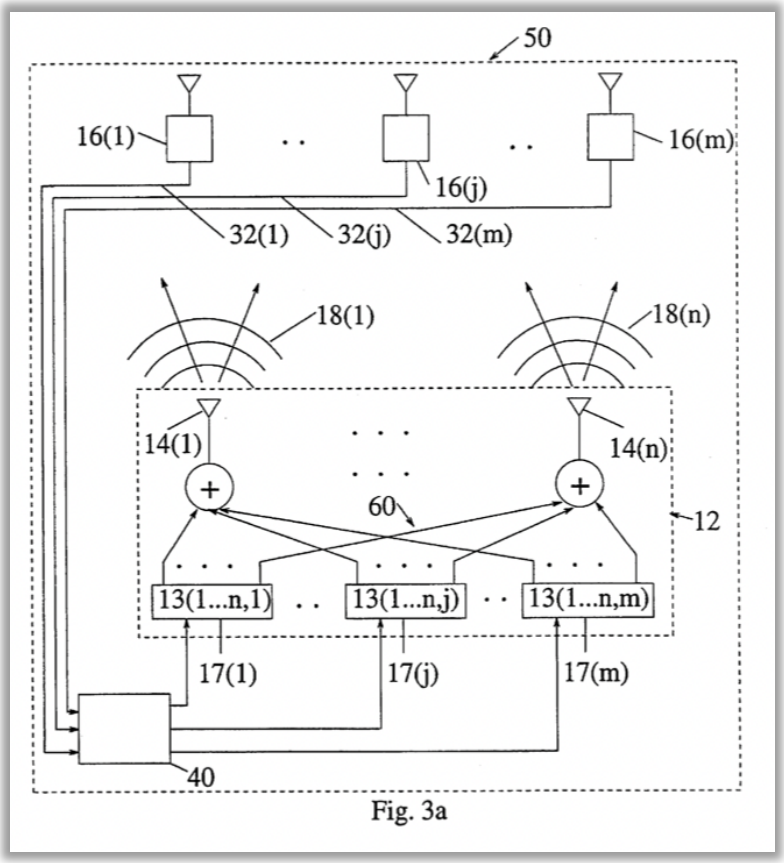

Fig. 3a

For example, Petitioners admit that Gerlach does *not* teach or suggest various limitations of the '376 patent's challenged claims, including, as the Petition admits:

- Gerlach does not disclose the '376 patent's "processor" because "Gerlach does not explicitly describe the component that generates" its signals. Pet. at 27.
- Gerlach does not disclose the '376 patent's "transceiver" because "Gerlach's Figures do not explicitly show a transmitter or receiver" (and Petitioners point to no disclosure of a transmitter alone, receiver alone, or a transceiver within Gerlach). Pet. at 31.
- Gerlach does not disclose the '376 patent's "memory" because Gerlach "does not explicitly mention the use of a memory." Pet. at 43.

- Gerlach does not disclose "feedback signals [being] received by a receiver and provided to the weight computer after appropriate signal processing," in Fig. 3a or anywhere else in Gerlach. Pet at 49.

B. Barratt and Okamoto Secondary References

Barratt (Ex. 1006) was previously considered during prosecution of the '376 patent. Barratt relates to "using antenna arrays and signal processing to dramatically increase the capacity and performance of wireless communication systems." Barratt at 1:15–18. Petitioners rely on Barratt as an obviousness combination with Gerlach for various limitations that Gerlach does not disclose. *See* Pet. at 15 (alleging that Barratt provides missing details from Gerlach, including "the architecture of a network-based wireless apparatus including its transmitting array, and of handling uplink communication between the remote devices and network-based apparatus").

Okamoto (Ex. 1007) relates to algorithms which were studied and simulated in connection with wireless communications. Okamoto at 1. Petitions only use Okamoto in an obviousness combination under Ground 2 for certain limitations in dependent claims 10, 19, and 21. *See* Pet. at 74 ("[T]he combination [of Gerlach and Barratt] does not explicitly disclose IEEE 802.11 or wireless local area networks as recited in claims 10, 19 and 21. Okamoto discloses these limitations.").

IV. Petitioners Fail to Show Invalidity of the "Processor" Limitations

The Petition asserts that "the combination of Gerlach and Barratt discloses or suggests 'a processor' configured as described in the limitations discussed in

Sections X.B.2.b(i) and X.B.2.b(ii)." Ex. 1003 ¶ 105; Pet. at 30–31. But Dr. Ding and Petitioners have failed to show that the combination of Gerlach and Barratt discloses or suggests "a processor configured to . . ." as required by claim 1 and the challenged claims.

A. Requirements of "Processor" Limitations

Claim 1 of the '376 patent recites, in part, the following requirements of the claimed "processor":

[1A]	a processor configured to:
[1A(i)]	generate a probing signal for transmission to at least a first client device and a second client device;
[1A(ii)]	generate a first data stream for transmission to the first client device; and
[1A(iii)]	generate a second data stream for transmission to the second client device; and

Claim 1 also recites the "processor," "transceiver," and "smart antenna" as separate elements. *See* claim [1C] ("wherein one or more of the processor, the transceiver, or the smart antenna is further configured to"). Based on this claim language, a POSITA would understand that the claimed "processor," "transceiver," and "smart antenna" are distinct components. Vojcic Decl. ¶¶ 41–42. This is

consistent with the remaining language of claim 1. For example, claim [1B] recites "a transceiver operatively coupled to the processor and configured to . . ." None of the claim language of claim 1 or other challenged claims indicates that the "processor," "transceiver," and "smart antenna" can be satisfied by the same component. *Id.* A POSITA would understand that they are distinct components of the overall "data-communications networking apparatus." *Id.*

The specification and prosecution history of the '376 patent is also consistent with the claimed "processor," "transceiver," and "smart antenna" being distinct components. For example, figures and corresponding written description depict the processor and smart antenna as separate components. *See, e.g.,* Figs. 2, 3, 6, 7, 8A, 8B, 13 (and corresponding written description):

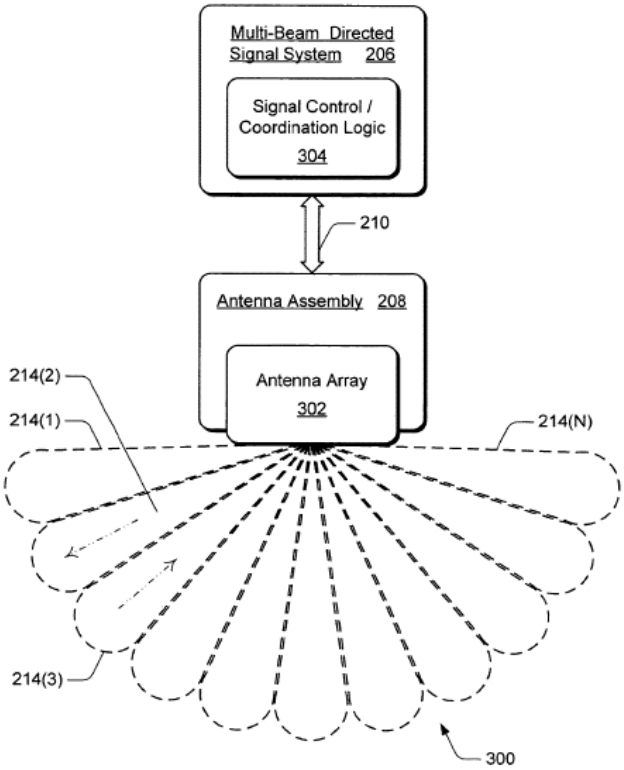
Multi-Beam Directed Signal System 206
Signal Control / Coordination Logic 304
210
Antenna Assembly 208
Antenna Array 302
214(2)
214(1)
214(N)
214(3)
300

Fig. 3

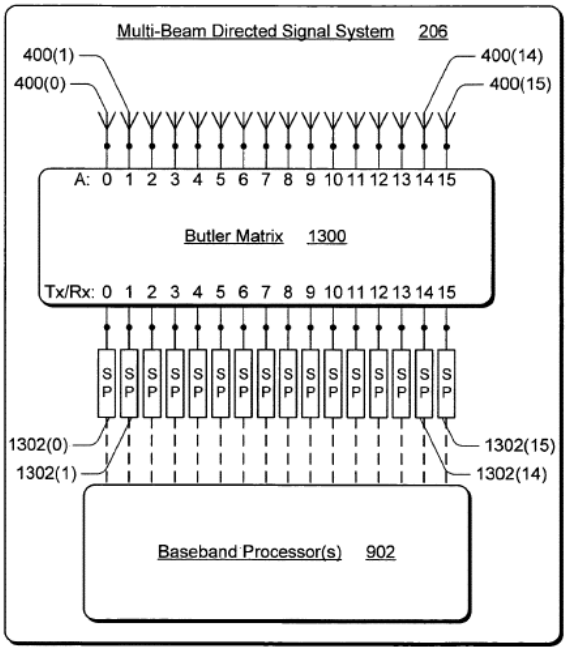
Multi-Beam Directed Signal System 206
400(1)
400(0)
400(14)
400(15)
A: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
Butler Matrix 1300
Tx/Rx: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
SP
1302(0)
1302(1)
1302(15)
1302(14)
Baseband Processor(s) 902

Fig. 13

B. The Petition fails to show that Gerlach discloses the claimed "processor."

The Petition and Dr. Ding asserts that "Gerlach inherently discloses or at least suggests a processor configured to perform the functionality of the limitations [of claim 1]." Ex. 1003 ¶ 109; Pet. at 28. This fails. Gerlach does not disclose or suggest the claimed processor, and the Petition fails to show that Gerlach alone discloses or renders the "processor" limitations obvious. Vojcic Decl. ¶¶ 43–49.

As an initial matter, Gerlach does not disclose the claimed processor, i.e., "a processor configured to: generate a probing signal for transmission to at least a first client device and a second client device; generate a first data stream for transmission to the first client device; and generate a second data stream for transmission to the second client device." Claim [1A]–[1A(iii)]. As the Petition and Dr. Ding acknowledges, "while Gerlach describes the general concept of a wireless communications system, it has a limited description of the implementation details of a wireless network-apparatus. The specific implementation is left as a design choice to one who implements the system." Ex. 1003 ¶¶ 93–94. Because Gerlach only describes the "general concept" of a wireless communication system and fails to describe the "implementation details" of the system at the level required by the claims, Gerlach fails to disclose expressly or at all a "processor" that satisfies the requirements of claim 1.

For example, the Petition and Dr. Ding points to signal 17(1) of Gerlach as the claimed "probing signal." Ex. 1003 Ex. 1003 ¶¶ 116–17 (annotating Gerlach Fig. 3a "to show probing signal 17(1) at left and probing signal 17(m) at right"); Pet. at 24–25 (asserting that Gerlach's wireless system "transmits the same 'probing signal' (e.g., 17(1)) to 'at least a first client device and a second client device' (e.g., 16(1)-16(m))"). Dr. Ding further points to information signals 19(1) and 19(m) as the claimed "first data stream" and "second data stream," respectively. Ex. 1003 ¶¶ 121–23; Pet. at 27 (asserting that "Gerlach discloses or suggests 'a first data stream [e.g., 19(1)] for transmission to the first client device [e.g., 16(1)]' and 'a second data stream [e.g., 19(m)] for transmission to the second client device [16(m)].'").

But Gerlach has no disclosure of where or how signal 17(1) or information signals 19(1) and 19(m) are generated. This is evident from Figs. 3a and 3b of Gerlach (and corresponding written description) that merely show the signals 17 and 19 in isolation and not originating from any other component (Ex. 1005, Figs. 3a, 3b annotated), and explicitly not emanating from shown weight computer 40:

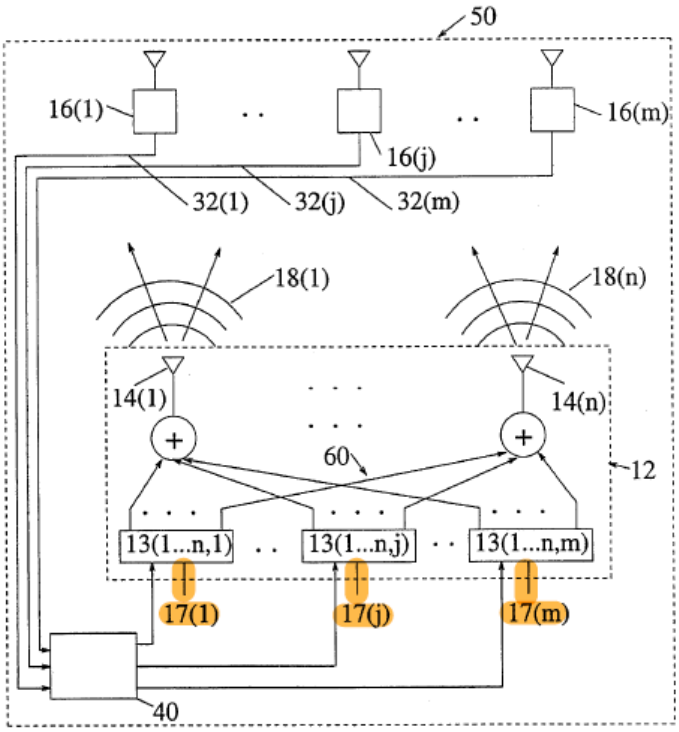
50
16(1)
16(m)
16(j)
32(1)
32(j)
32(m)
18(1)
18(n)
14(1)
14(n)
60
12
13(1...n,1)
13(1...n,j)
13(1...n,m)
17(1)
17(j)
17(m)
40

Fig. 3a

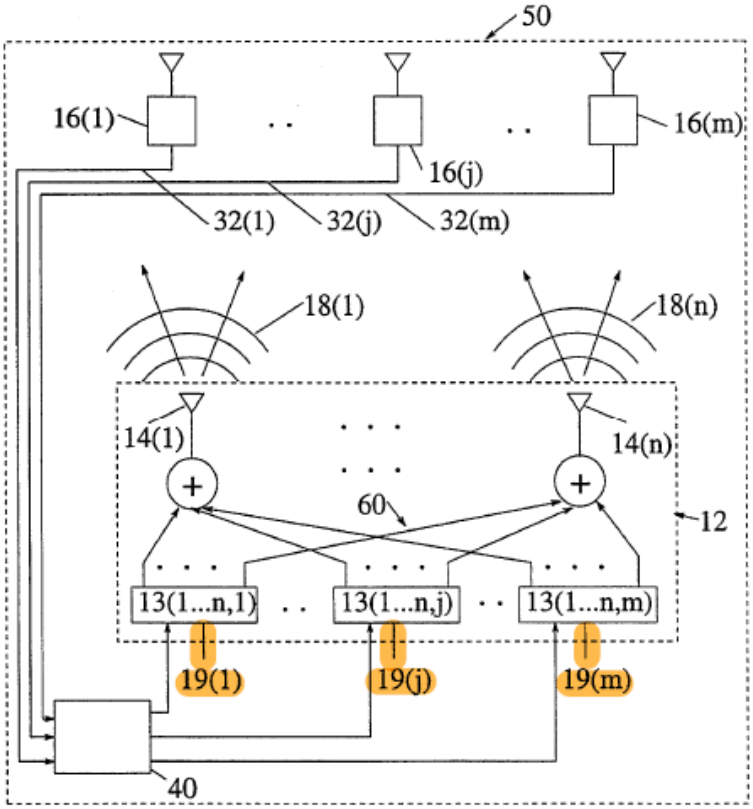
50
16(1)
16(m)
16(j)
32(1)
32(j)
32(m)
18(1)
18(n)
14(1)
14(n)
60
12
13(1...n,1)
13(1...n,j)
13(1...n,m)
19(1)
19(j)
19(m)
40

Fig. 3b

Accordingly, there is no disclosure in Gerlach of a "processor configured to" generate signal 17(1). A POSITA would understand that the alleged probing signals 17(1) . . . 17(m) need not be generated by a processor at all and, for example, could be hard coded into the system. Vojcic Decl. ¶ 47. Nor is there any disclosure in Gerlach of "a processor configured to" generate information signals 19(1) and 19(m). Nor is there any disclosure in Gerlach of the *same processor* that generates all of signals 17(1), 19(1), and 19(m), as required by Dr. Ding's mapping of Gerlach to the claimed processor that generates "a probing signal," "first data stream," and "second data stream."

Indeed, the Petition acknowledges that "Although Gerlach teaches that the transmitting array receives both probing signals 17 and information signals 19 for transmission, Gerlach does not explicitly describe the component that generates these signals." Pet. at 27. This demonstrates that Gerlach does not disclose or suggest the component that generates signals 17 and information signals 19. Further, it confirms that Gerlach does not disclose or suggest that the *same component* generates signals 17 and information signals 19. Those details are entirely missing from Gerlach. For these reasons, Gerlach fails to disclose claimed "processor" recited in claim 1 of the '376 patent. Vojcic Decl. ¶ 48

For the same reasons, the "processor" limitations are not inherent and Gerlach fails to inherently disclose those limitations. Vojcic Decl. ¶ 49. Inherency requires a

limitation to be necessarily or always present. Based on this, "a processor configured to generate . . ." of claim 1 of the '376 patent cannot be inherent in Gerlach. At a minimum, and based on Petitioner's and Dr. Ding's own statements, there are various architectural designs or implementations of Gerlach that would not satisfy the "processor" limitations. Ex. 1003 ¶¶ 93–94 (acknowledging that Gerlach has limited implementation details and that the "specific implementation is left as a design choice to one who implements the system."). For example, it would not be required to implement probing signals in a processor, and there is no suggestion of that in Gerlach. Vojcic Decl. ¶. A probing signal could simply be generated in hardware depending on the implementation or design. As another example, different hardware components (e.g., baseband modulators) other than a processor could be used to generate Gerlach's signals 17 and information signals 19. *Id.* Further, each signal 17(1)-17(m) and 19(1), and 19(m) could be generated by hardware and different hardware components. *Id.*

C. The Petition fails to show that Gerlach suggests or renders obvious the claimed "processor."

In the alternative, the Petition and Dr. Ding assert that Gerlach alone "suggests" or renders obvious the processor limitations. This fails because Petitioner and Dr. Ding are using claim 1 of the '376 patent as a roadmap to speculate obviousness. Vojcic Decl. ¶¶ 50–63. Further, Dr. Ding's opinions boil down to his

assertion that Gerlach "*could be*" implemented with a processor that allegedly satisfies the requirements of claim 1, but he fails to show that a POSITA "*would be"* motivated to do so, especially in view of Gerlach's very narrow focus on the antenna array block. This is evident since Dr. Ding asserts in blanket fashion various implementations of Gerlach that would not even satisfy the "processor" limitations. Dr. Ding fails to distinguish between the different implementations he proposes, which undermines any assertion that a POSITA would be motivated to pursue a particular implementation. As a result, Dr. Ding fails to show the "why" and "how" a POSITA would be motivated to modify Gerlach to arrive at the claimed invention.

Dr. Ding asserts at paragraph 107 that: "A person having ordinary skill in the art would have understood that one or more processors would be used to generate "information signals 19 and probing signals 17." Ex. 1003 ¶ 107. As support, Dr. Ding cites several references that perform baseband modulation (bit-to-symbol mapping) to argue that a POSITA would understand that "a processor configured" would implement baseband modulation required to generate information signals. But there is no suggestion in Gerlach for such a need as Gerlach is narrowly focused on using feedback signals to form an antenna pattern with a single peak for the intended receiver using an antenna array. Vojcic Decl. ¶ 51.

In view of Gerlach's teachings, a POSITA would not understand or be motivated to implement baseband modulators in Gerlach's processor as Petitioner

and Dr. Ding suggests. *Id.* ¶ 52. Notably, the Barratt secondary reference explicitly does *not* implement baseband modulators in the processor. This undermines Dr. Ding's assertion that a POSITA would implement baseband modulators in a processor based on Gerlach alone. Therefore, it would not be obvious to implement baseband modulation for forming information signal in a processor. *Id.* Likewise, it would not be obvious to implement probing signals in a processor because there is no suggestion for that in Gerlach and probing signals could be simply generated in hardware. *Id.* None of these modifications have any support in Gerlach, which has limited or no implemental details of the system and (according to Dr. Ding) the "specific implementation is left as a design choice to one who implements the system." Ex. 1003 ¶¶ 93–94. Dr. Ding is attempting to implement Gerlach to allegedly satisfy the claims, but impermissibly using claim 1 of the '376 patent as a roadmap for doing so *Id.*

To support a suggestion of a processor in Gerlach configured to implement the "processor limitations" of claim 1 of the '376 patent, Petitioner and Dr. Ding points to weight computer 40 in Gerlach for processing feedback signals (Ex. 1005, 3:45-47). Ex. 1003 ¶ 108; Pet. at 29. That portion of Gerlach states: "Feedback signals 32 are conveyed to weight computer 40 in array 12 for processing." Ex. 1005 at 3:45–47. But that disclosure in Gerlach is by no means a suggestion of a processor configured to generate probing signals and a first and second data streams as required

by claim 1. Vojcic Decl. ¶ 53. Gerlach's weight computer 40 in array 12 extracts information from feedback signals to compute weights and achieve beam forming objectives ("Feedback signals 32 are conveyed to weight computer 40 in array 12 for processing," Ex. 1005, 3:46-48), no need for an additional processor is disclosed. *Id.* Narrowly focused Gerlach (on the antenna array block) does not need a processor for generating probing signals or to perform baseband modulation. *Id.*Moreover, Gerlach explicitly shows in Figs. 3a and 3b that probing signals (17) and information signals (19) are not emanating from weight computer (40) that Dr. Ding suggests being "a processor configured to." *Id.*

This further demonstrates that Gerlach does not suggest a processor that generates probing signals 17 and information signals 19. *Id.* ¶ 54. If it did, one would expect a processor to be shown in Gerlach's figures or for signals 17 and information signals 19 to be emanating from weight computer 40. Thus, Petitioner and Dr. Ding's conclusory statement is not supported by his citation to Gerlach. Moreover, explained above, probing signals could be generated in hardware, just as baseband modulators for generating modulating signals could be advantageously implemented outside a processor, as shown in Barratt. Vojcic Decl. ¶ 51. Petitioner is using impermissible hindsight to read into Gerlach what is not disclosed suggested in the reference.

The Petition on page 29 and Dr. Ding in paragraph 108 summarizes their obviousness theory and conclusion based on Gerlach alone. They assert: "A person having ordinary skill in the art would have sought to use a processor—whether the same processor that implements the weight computer or one or more additional processors—to execute software instructions for generating modulating signals." Ex. 1003 ¶ 108; Pet. at 29. This theory fails for several dispositive reasons. As a result, Gerlach does not render obvious the "processor" limitations.

First, Dr. Ding's generalized assertion that a POSITA "would have sought to use a processor" in Gerlach is insufficient for meeting the "processor" limitations. Vojcic Decl. ¶ 56. Claim 1 of the '376 patent requires a processor configured to generate a probing signal for multiple client devices and to generate a first data stream for transmission to a first client device and a second data stream for transmission to a second client device. The Petition and Dr. Ding's generalized motivation to use a processor in Gerlach is not specific to the claim requirements. For example, the Petition does not describe any motivation for using a processor to generate probing signals (compared to other hardware or architecture designs). *Id.* Nor does the Petition describe any motivation for using the same processor to generate first and second data streams. *Id.* Especially since Gerlach fails to disclose the claimed "processor," the Petition needed to explain why and how a POSITA

would implement a processor in Gerlach to arrive at the claimed invention. The Petition and Dr. Ding failed to do so.

Second, the Petition and Dr. Ding's primary theory that a POSITA would have sought to use "the same processor that implements the weight computer" (Ex. 1003 ¶ 108) as the claimed "processor" is fatally flawed. Vojcic Decl. ¶¶ 57–61. Dr. Ding and Petitioners repeatedly identifies Gerlach's weight computer 40 as part of the claimed "smart antenna." *See, e.g.*:

- "Accordingly, ***weight computer 40***, components of transmitting array 12 (highlighted blue in annotated Fig. 3b above) and the antenna array *together are a "smart antenna" because these components allow the directed beampattern to be adjusted."* Ex. 1003 ¶ 139 (emphasis added);
- "As shown in Gerlach's Fig. 3b, the antenna elements, components of transmission array that adjust the generated beampattern, *and the weight computer (collectively the 'smart antenna')* are coupled to the transmitter and receiver ('transceiver')" Ex. 1003 ¶ 139 (emphasis added).
- Accordingly, weight computer 40, components of transmitting array 12 (shaded blue in Fig. 3b) and the antenna array collectively comprise "smart antenna" because these components allow the directed beampattern to be adjusted. Ding, ¶139." Pet. at 38.

The Petition and Dr. Ding likewise asserts that weight computer 40 is part of the claimed "smart antenna" to support their mapping for the challenged dependent claims that recite "one or more of the processor, the transceiver, or the smart antenna is further configured to . . ." *See* Claims 2–6, 13–17, 23–29, 33–34.

Furthermore, the Petitioner and Dr. Ding's theory that weight computer 40 could be claimed "a processor" is clearly wrong in view of Gerlach itself that states that weight computer 40 is part of antenna array (Feedback signals 32 are conveyed to weight computer 40 in array 12 for processing," Ex. 1005, 3:46-48), as also noted by Dr. Ding. Ex. 1003 ¶ 71. Moreover, Dr. Ding is mapping, in view of Gerlach, array 12 (including weight computer 40) as claimed smart antenna for the limitation "wherein one or more of the processor, the transceiver, or the smart antenna is further configured to: … transmit first data stream … transmit the second data stream …" Ex. 1003 ¶ 170-173. It is incorrect to use weight computer 40 for both the claimed "processor" and "smart antenna." Vojcic Decl. ¶ 59.

Because Gerlach's weight computer 40 is already part of the alleged "smart antenna," it cannot constitute the separate "processor" claim element. Vojcic Decl. ¶ 61. As discussed above, both the claim language and specification of the '376 patent support the understanding that the "processor" and "smart antenna" are distinct components. *Id.* A POSITA would not understand that Gerlach's weight computer 40 could both be a portion of the claimed "smart antenna" and the claimed

"processor." *Id.* Therefore, Dr. Ding's primary obviousness theory that a POSITA would have sought to use "the same processor that implements the weight computer" as the claimed processor would not even work. The resulting combination (itself inadequately explained) would not meet the claim language reciting "processor," "transceiver," and "smart antenna" as separate elements.

Third, the Petitioner's and Dr. Ding's overall assertion, that a POSITA "would have sought to use a processor—*whether the same processor that implements the weight computer or one or more additional processors*" demonstrates the lack of motivation to combine here. Vojcic Decl. ¶¶ 63. The Petition and Dr. Ding merely identify several possibilities for the hypothetical processor, primarily as the weight computer or one or more additional, unknown processors somewhere in the system. At most, this shows that different implementations are possible (with or without additional processors), and that some undisclosed permutation is alleged to satisfy claim 1. *Id.* But the Petition and Dr. Ding fail to distinguish between the different implementations he proposes, including those that cannot satisfy the claims. *Id.*

This undermines any assertion that POSITA would be motivated to pursue a particular implementation that allegedly satisfies the "processor" limitations. Dr. Ding is opining that a POSITA *could* do certain implementations, not that a POSITA *would* be motivated to do so. Nor does Dr. Ding give any specific explanation or evidence for why a POSITA would be motivated to implement Gerlach to meet the

claimed "processor," beyond the general motivation of using processors, which may or may not meet the claims. *Id.*

Fourth, the Petition and Dr. Ding's reference to "one or more additional processors" is entirely non-specific and unsupported. Vojcic Decl. ¶¶ 63. Dr. Ding fails to articulate what they are, where they are located, and what functions they perform. *Id.* Such a theory fails for the same reasons above. In view of Gerlach, the Petition and Dr. Ding have failed to explain any motivation for adding "one or more additional processors" to perform the claimed functions. *Id.* The Petition and Dr. Ding are attempting to implement Gerlach to satisfy claim 1, but impermissibly using claim 1 of the '376 patent as a roadmap for doing so. *Id.*

D. The Petition fails to show that Gerlach in combination with Barratt suggests or render obvious the claimed "processor."

For the same reasons as Gerlach alone, Gerlach in combination with Barratt fails to suggest or render obvious the claimed "processor." Vojcic Decl. ¶¶ 64–66. The Petition and Dr. Ding's reliance on Barratt does not cure any of the deficiencies discussed above for the obviousness theory based on Gerlach alone. *Id.* Indeed, the combination with Barratt includes additional deficiencies that further undermine the theory.

The Petition and Dr. Ding suggests that a POSITA "would have found it obvious to implement Barratt's signal modulators 25 in software on a processor,

either using the same CPU as the base station controller or using one or more additional processors." Ex. 1003 ¶ 111; Pet. at 30. This fails and again is impermissible hindsight. The Petition and Dr. Ding is using the invention as a roadmap to obviousness. First, a POSITA would understand that the base station controller normally does not do signal modulation, just as the signal modulators in Barratt were explicitly outside of the base station controller. Vojcic Decl. ¶ 65. Second, there was not suggestion in Barratt, nor has the Petition or Dr. Ding pointed to any, that signal modulators could be implemented in one or more processors. *Id.* The Petition and Dr's. Ding theory is that signal modulators could be implemented in software running on processors. *Id.* But Barratt undermines that theory because it shows the opposite. *Id.* It shows dedicated the use of dedicated signal modulators, not software-based signal modulators running on the processor. *Id.*

The Petition and Dr. Ding assert that "a person having ordinary skill in the art would have found it obvious to incorporate Barratt's modulators/processor(s) in Gerlach to generate the probing and first/second information signals for the reasons discussed in Section X.B.1." Pet. at 30; Ding Decl. ¶ 112. This fails. First, Dr. Ding in Section X.B.1 did not discuss motivation to combine Gerlach and Barratt to incorporate Barratt's signal modulators in Gerlach to generate the probing and first/second information signals. Further, as discussed above, the Petition and Dr. Ding's obviousness logic is flawed for various reasons and, a POSITA would not be

motivated to modify Barratt to include signal modulators in the base station controller or other processor. Vojcic Decl. ¶ 66. Nor would a POSITA be motivated to bring such modified processor in Barratt into Gerlach (which itself is unexplained) *Id.* For example, the Petition and Dr. Ding has never adequately articulated why a POSITA would be motivated to add a processor to Gerlach to generate probing signals (and other limitations) where Gerlach has no such suggestion. *Id.* Barratt does not address that deficiency since it does not describe probing signals or Gerlach's feedback concepts. *Id.*

V. Petitioners Fail to Show Invalidity of the "Transceiver" Limitations

Under its plain and ordinary meaning, "transceiver" refers to a single unit comprising a transmitter and a receiver, with common circuit components for transmitting and receiving. Vojcic Decl. ¶ 67; Ex. 2016 ("The combination of radio transmitting and receiving equipment in a common housing, usually for portable or mobile use, and employing common circuit components for both transmitting and receiving."); Ex. 2017 ("A radio transmitter and receiver combined in one unit and having switching arrangements such as to permit use of one or more tubes for both transmitting and receiving."). In particular, a combination of a transmitter with an unrelated receiver, *e.g.*, a receiver for a different communication technology, is not a "transceiver." Vojcic Decl. ¶ 67.

Petitioner concedes that Gerlach does not expressly disclose either a receiver

or a transmitter, much less a transceiver. Pet. at 32. In fact, as Dr. Vojcic explains, Gerlach shows and describes the transmit and receive channels as entirely separate, teaching away from the use of a transceiver as described and claimed in the '376 Patent. Vojcic Decl. ¶ 68.

Petitioner's assertion is that Gerlach inherently discloses at least a transmitter because it must include a transmitter to transmit signals 18. Pet. at 32. The Petition identifies only a single location for the transmitter in Gerlach: as part of transmitting elements 14. *Id.* ("The transmitting elements 14 in Gerlach's network-based apparatus each must include a transmitter to effectuate the transmission of signals 18 to the remote devices."). Petitioner also argues that Gerlach must include a receiver in order to receive the feedback signals 32. *Id*.

As Dr. Vojcic explains, Petitioner and its expert do not show the presence of a receiver. Gerlach does not specify or limit how feedback signals 32 are transferred from receivers 16 to weight computer 40. Vojcic Decl. ¶ 70. In many possible embodiments, feedback signals are transferred using some separate channel unrelated to the channel used for transmissions signals 18. *Id.* For example, it is possible to use wires for the feedback signals 32, or to send the feedback signals using a different radio link. *Id.* A POSITA would understand that such an embodiment would be beneficial because, for example, it would reduce contention on the forward channel and would cleanly separate the forward and reverse channels.

In each of these situations, Dr. Vojcic explains that an embodiment of Gerlach would not include a transceiver under the plain and ordinary meaning of that term. Vojcic Decl. ¶ 71. For example, the transmit and receive chains might use different technologies. Or, in the case of using different radio bands, the transmitter and receiver would be separated, for example by having separate front ends and other parts of the transmit and receive chains, in contrast to the plain and ordinary meaning of "transceiver." Vojcic Decl. ¶ 71.

Furthermore, Petitioner does not show that the supposed transmitter and receiver in Gerlach form a single unit or have common components. Vojcic Decl. ¶ 72. Again, in the Petition's sole theory, the putative transmitters are within transmitting elements 14, and the putative receiver is associated with feedback signals 32. There is no logical relationship shown between transmitting elements 14 and feedback signals 32. Vojcic Decl. ¶ 72. As shown in Gerlach, there are several components separating transmitting elements 14 and feedback signals 32, including connections 60, the weight matrix with its complex amplitudes 13, and the entirety of weight computer 40. Gerlach, Figs. 3a, 3b. The Petition gives no basis why these separately located transmitters and receiver would be formed in a single unit or share common components. *See* Vojcic Decl. ¶ 72.

Specifically, the Petition does not show that Gerlach inherently discloses that the supposed transmitters and receivers form a single unit and share common

components, because there are many possible embodiments that do not have those attributes. Vojcic Decl. ¶ 73. For example, if the feedback signals 32 are received using antenna element(s) distinct from the forward channel elements 14, then it would be unlikely for the transmitter(s) and receiver(s) to share components. *Id.* Furthermore, if the forward and reverse channels are designed to operate simultaneously (e.g., using different frequency bands), then the transmitter(s) and receiver(s) would necessarily be fully independent. *Id.*

In addition, the Petition does not establish that it would be obvious to modify Gerlach to add a unitary transceiver for both the transmit elements 14 and the reception of feedback signals 32. As Dr. Vojcic explains above, there are numerous possible implementations of Gerlach, many of which would not include a transceiver as claimed. Vojcic Decl. ¶ 74. Furthermore, Petitioner and its expert do not provide specific, nonconclusory explanations or evidence why it would be obvious, in light of Gerlach alone, to contain a transceiver in which the transmitter and receiver share components. *Id.*

Presumably realizing that its inherent disclosure theory is insufficient, Petitioner relies on an obviousness combination with Barratt to show a "transceiver." Pet. at 33-35. This does not succeed either. In the primary obviousness theory regarding Gerlach and Barratt, the disclosure of a multichannel transmitters 14 and multichannel receivers 15 purportedly constitutes a "transceiver." Pet. at 33-34. This

does not show a transceiver, because it suffers from the same technical flaws as the theory based on Gerlach alone. Vojcic Decl. ¶¶ 75-76.

For example, Barratt discloses that transmitters 14 are coupled to transmit antenna elements 18, and receivers 15 are coupled to receive antenna elements 19. Ex. 1006, Fig. 1; *id.* at 8:60-67 (describing separate transmit antennas 18). Transmitters 14 and receivers 15 are not even coupled to each other as disclosed in Barratt, much less are they part of a single unitary transceiver. Vojcic Decl. ¶ 76. Furthermore, Barratt expressly teaches that the uplink channel (associated with receivers 15) and downlink channel (associated with transmitters 14) may be qualitatively different. Barratt at 9:1-17:

> In the illustrative embodiment the number N_{cc} of downlink conventional channels is the same as the number N_{cc} of uplink conventional channels. In other embodiments, there may be different numbers of uplink and downlink conventional channels. Furthermore, the channels may be of different types and bandwidths as is the case for an interactive television application where the downlink is comprised of wideband video channels and the uplink employs narrowband audio/data channels.
>
> Additionally, the illustrative embodiment shows the same number of antenna elements, m, for transmit and receive. In other embodiments, the number of transmit antenna elements and the number of receive antenna elements may be different, up to and including the case where transmit employs only one transmit antenna element in an omnidirectional sense such as in an interactive television application.

In the cases where the uplink and downlink channels are different, a single transceiver may not be used. Vojcic Decl. ¶ 77. Therefore, even if Dr. Ding is correct

that a POSITA would combine Gerlach and Barratt, Dr. Ding does not show that the combination renders obvious the use of a transceiver as taught and claimed in the '376 Patent. Vojcic Decl. ¶ 77.

Finally, the Petition turns to a secondary obviousness reference, relying on a brief alternative embodiment of Barratt in an attempt to establish a transceiver in which the transmitter and receiver share components, as required by the plain and ordinary meaning of "transceiver." Pet. at 35 (quoting Barratt at 20:30-35). But there is no explanation why a POSITA would be motivated to combine Gerlach, not with Barratt's primary and preferred embodiment, but with the sketchily disclosed alternative embodiment of 20:30-35. In his report, Dr. Ding gives only one reason why a POSITA would combine this embodiment of Barratt with Gerlach: "A person having ordinary skill in the art would have been motivated to use this embodiment having a shared antenna array and duplexer to minimize the space and cost taken by the antenna arrays at a base station which is size constrained and to minimize overall base station cost." Ding Decl. ¶ 82.

As Dr. Vojcic explains, Dr. Ding has not shown that a POSITA would be motivated to combine Gerlach with the specific alternative embodiment of Barratt that contains a shared antenna array and duplexer. Vojcic Decl. ¶ 79. In particular, Dr. Ding gives no explanation why a POSITA would consider space and cost to be important enough to justify the use of a shared antenna array and duplexer. *Id.*

Nothing in Gerlach teaches that cost or space are significant considerations. *Id.* Dr. Ding improperly relies on these entirely generic "motivations," which if accepted would motivate virtually any putative improvement and impermissibly expand the obviousness analysis to allow unlimited picking and choosing among elements of prior art. As Dr. Vojcic explains, there are furthermore downsides to the alternative Barratt embodiment—downsides that Dr. Ding and the Petition ignore. Vojcic Decl. ¶ 79. For example, using a shared antenna array and duplexer eliminates several attributes of both Gerlach and Barratt, and Dr. Ding does not explain why a POSITA at the time of the invention would find these compromises worthwhile. *Id.*

In fact, Barratt's primary embodiment (see Ex. 1006, Fig.1), which Dr. Ding used for the transceiver (Ex. 1008 ¶ 127), explicitly discloses completely separate sets of transmit and receive antenna array elements. Vojcic Decl. ¶ 80. It therefore is teaching away from Dr. Ding's obviousness theory of shared antenna arrays and duplexer. For the argument that transmitters and receivers share common elements, the duplexer and antenna array, Dr. Ding is using the alternative embodiment of Fig. 8 in Barrat. Dr. Ding is mixing the two incompatible embodiments without explaining how the incompatibility could be overcome. *Id.*

For example, as described above, Barratt explicitly teaches the benefits in design flexibility provided by the use of separate uplink and downlink channels, for example by having high-bandwidth downlink channels for television or video and

the uplink channels can be optimized for lower bandwidth, or by using only an omnidirectional, single-antenna uplink channel instead of the more complex and power-consuming multi-antenna downlink channel. Barratt at 9:1-17; Vojcic Decl. ¶ 81. Furthermore, a POSITA would understand that using separate uplink and downlink channels, with separate transmitter(s), receiver(s), and antenna element(s), would allow the use of distinct frequency bands, and numerous other design possibilities to tailor the wireless system for the unique demands of the uplink and downlink channels respectively. Vojcic Decl. ¶ 81. Using different frequency bands as in Barratt, sufficiently separated, *e.g.* 900 MHz and 2 GHz bands, would necessitate the use of separate antennas to achieve acceptable antenna efficiencies in each band. Vojcic Decl. ¶ 81.

Therefore, even if the Petition and Dr. Ding were generally correct that a POSITA would be motivated to combine Gerlach and Barratt in general, they have not shown that a POSITA would use the specific alternative embodiment with a shared antenna array and a duplexer. Rather, a POSITA considering these two references together would choose the primary embodiment of Barratt, with separate uplink and downlink channels, which more closely resembles the embodiments of Gerlach, with separate data transmission and feedback channels (corresponding to transmission signals 18 and feedback signals 32, respectively). Vojcic Decl. ¶ 82.

VI. Conclusion

The above two deficiencies for the "processor" limitations and "transceiver" have been discussed for independent claim 1. But they apply to all challenged claims (claims 1–34) under both asserted grounds. Therefore, the Board should find that Petitioners have failed meet their burden to prove unpatentability for any challenged claim of the '376 patent.

Respectfully submitted,

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CERTIFICATION REGARDING WORD COUNT

Pursuant to 37 C.F.R. §42.24(d), Patent Owner certifies that there are 7,346 words in the paper excluding the portions exempted under 37 C.F.R. §42.24(a)(1).

Dated: January 13, 2023

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CERTIFICATE OF SERVICE (37 C.F.R. § 42.6(e)(1))

The undersigned hereby certifies that the above document was served on January 13, 2023, by filing this document through the Patent Trial and Appeal Board End to End system as well as delivering a copy via electronic mail upon the following attorneys of record for Petitioners:

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